

**ARIZONA'S
Instrument to Measure Standards**

MATHEMATICS

**AIMS High School Form A
Administered Spring, 1999
Released Items**

Release Date: 01/26/01

The items contained here are reproductions of released items in Form A of Arizona's Instrument to Measure Standards. Every effort was made to duplicate the items exactly as published. If you have any questions, please contact Marie Mancuso, Language Arts, or Sheryl Major, Mathematics, at 602.542.5031. A PDF file with the camera-ready copy of the released items is available.

AIMS Reference Sheet

Area

Triangle	$\frac{1}{2}bh$
Rectangle	lw
Trapezoid	$\frac{1}{2}h(b_1 + b_2)$
Parallelogram	bh
Circle	πr^2

Key

b = base	d = diameter
h = height	r = radius
l = length	
w = width	
ℓ = slant height	

Use 3.14 or $\frac{22}{7}$ for π

Circumference = $\pi d = 2\pi r$

Volume

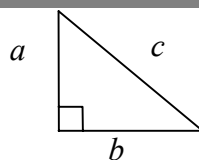
Right Circular Cone	$\frac{1}{3}\pi r^2 h$
Square Pyramid	$\frac{1}{3}lwh$
Sphere	$\frac{4}{3}\pi r^3$
Right Circular Cylinder	$\pi r^2 h$
Rectangular Solid	lwh

Total Surface Area

$\frac{1}{2}(2\pi r)\ell + \pi r^2 = \pi r\ell + \pi r^2$
$4(\frac{1}{2}l\ell) + l^2 = 2l\ell + l^2$
$4\pi r^2$
$2\pi rh + 2\pi r^2$
$2(lw) + 2(hw) + 2(lh)$

Midpoint between two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$:

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$



Pythagorean Theorem

$$c^2 = a^2 + b^2$$

Slope-intercept form of an equation of a line, where m = slope and b = the y -intercept:

$$y = mx + b$$

Distance between two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$:

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Quadratic Formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Slope between two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Distance, rate, time formula, where

d = distance, r = rate, t = time:

$$d = rt$$

AIMS Reference Sheet

TRIGONOMETRIC RATIOS			
Angle	sin	cos	tan
0°	0.0000	1.0000	0.0000
30°	0.5000	0.8660	0.5774
45°	0.7071	0.7071	1.0000
60°	0.8660	0.5000	1.7321
90°	1.0000	0.0000	∞

$$\sin A = \frac{opp}{hyp}$$

$$\cos A = \frac{adj}{hyp}$$

$$\tan A = \frac{opp}{adj}$$

Postulates:

Side-Side-Side (SSS)

Two triangles are congruent if the sides of one triangle are congruent to the sides of the other triangle.

Side-Angle-Side (SAS)

Two triangles are congruent if two sides and the included angle of one triangle are congruent to two sides and the included angle of the other triangle.

Angle-Side-Angle (ASA)

Two triangles are congruent if two angles and the included side of one triangle are congruent to two angles and the included side of the other triangle.

Theorems:

If two parallel lines are cut by a transversal, then each pair of alternate exterior angles is congruent.

If two parallel lines are cut by a transversal, then each pair of alternate interior angles is congruent.

If two parallel lines are cut by a transversal, then each pair of corresponding angles is congruent.

If two parallel lines are cut by a transversal, then each pair of interior angles on the same side of the transversal is supplementary.

If two parallel lines are cut by a transversal, then each pair of exterior angles on the same side of the transversal is supplementary.

Directions: Do Numbers 1 through 6.

1 Simplify: $-|7 - 3| - |-5|$

- A 9
- * B -9
- C 1
- D -1

* Students who answered this item correctly = 46%

2 Which of the following algorithms are equivalent?

- I Given two lines, draw a transversal. If the alternate interior angles are equal, then you have the answer you are looking for.
- II Given two lines, compare their slopes. If they are equal, then you have the answer you are looking for.
- III Given two lines, compare their slopes. If they are negative reciprocals, then you have the answer you are looking for.

- * A I and II
- B II and III
- C I and III
- D I, II, and III

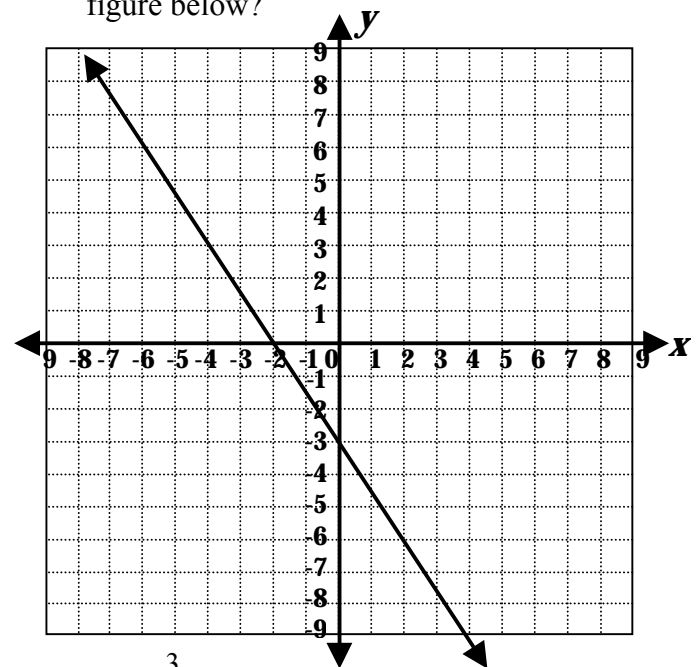
* Students who answered this item correctly = 27%

3 Twice the product of t and m is represented by which expression?

- * A $2tm$
- B $tm + 2$
- C $\frac{2t}{m}$
- D $\frac{t}{m}$

* Students who answered this item correctly = 79%

4 What is the slope of the line shown in the figure below?



- A $\frac{3}{2}$
- B $\frac{2}{3}$
- * C $-\frac{3}{2}$
- D $-\frac{2}{3}$

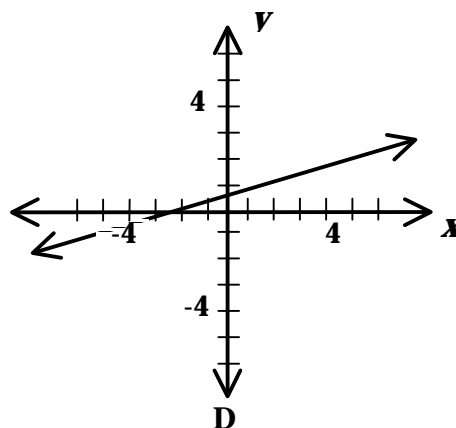
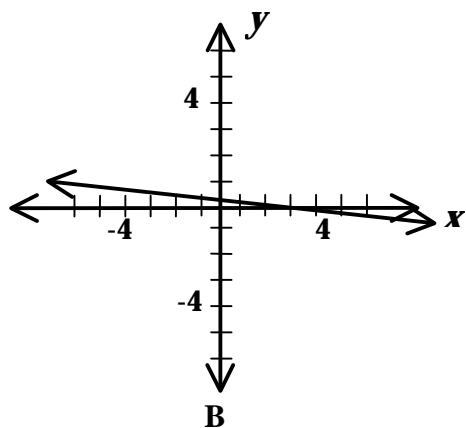
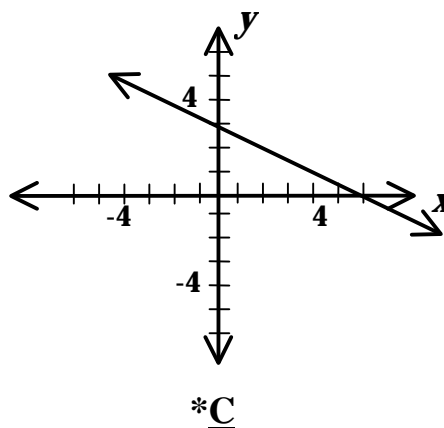
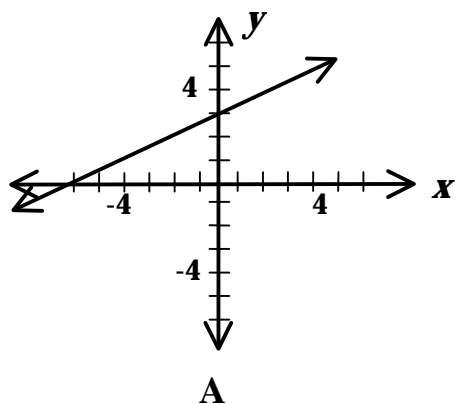
* Students who answered this item correctly = 44%

- 5 What is 93,000,000 written in scientific notation?

A 93×10^6
 B 93×10^7
 * C 9.3×10^7
 D 9.3×10^6

* Students who answered this item correctly = 45%

- 6 Which of these graphs correctly represents the equation $y = -\frac{1}{2}x + 3$



* Students who answered this item correctly = 46%

Directions: Do Numbers 7 - 17.

7 Simplify: $(x + 7)(x - 4)$

- A $2x + 3$
- B $x^2 - 28$
- C $x^2 - 3x - 28$
- * D $x^2 + 3x - 28$

* Students who answered this item correctly = 49%

8 What is the product of $(3xy^2)(2x2y^3)$?

- A $5x^3y^6$
- B $5x^2y^6$
- C $6x^2y^6$
- * D $12x^2y^5$

* Students who answered this item correctly = 44%

9 Solve: $4(6x - 10) = 8x + 40$

- A 0
- B $\frac{5}{2}$
- C $\frac{25}{8}$
- * D 5

* Students who answered this item correctly = 50%

10 Simplify: $\sqrt[3]{125x^3y^6z^9}$

- A $5x^2z^3$
- B $5xy^3z^6$
- * C $5xy^2z^3$
- D $25xy^3z^3$

* Students who answered this item correctly = 45%

11 Which of these arguments is valid?

- A Figure ABCD is a rectangle, or figure ABCD is not a rectangle. Therefore, figure ABCD is a trapezoid.
- B All freshmen take Algebra 1. John is taking Algebra 1. Therefore, John is a freshman.
- C All rectangles are parallelograms. Figure ABCD is a parallelogram. Therefore, figure ABCD is a rectangle.
- * D The teacher said students could not receive an A in the class unless they got an A on the final exam. Ashley received an A in the class. Therefore, Ashley got an A on the final exam.

* Students who answered this item correctly = 38%

12 The volume of a shipping container is given by the formula below. What is the value of h in terms of the other three variables?

$$V = lwh$$

- A $h = V - l - w$
- B $h = (l - w)$
- * C $h = \frac{V}{lw}$
- D $h = \frac{lw}{V}$

* Students who answered this item correctly = 50%

- 13** Which of these equations represents a line passing through (5, 3) and (-5, -3)?

* **A** $y = \frac{3}{5}x$
B $y = \frac{5}{3}x$
C $y = 5$
D $y = 3$

* Students who answered this item correctly = 36%

- 14** Dorothy and Simon are going to the movies. They can choose from Movie E, Movie F, and Movie G, but both of them will go to the same movie. What is the sample space for this situation?

A {EE, EF, EG, FE, FF, FG, GE, GF, GG}
B {EF, EG, FE, FG, GE, GF}
* **C** {EE, FF, GG}
D {EF, GE}

* Students who answered this item correctly = 51%

- 15** Which of these statements is true about the graphs of the equations below?

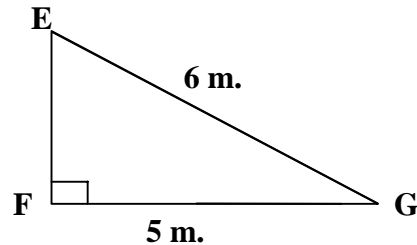
$$y = 2x + 6$$

$$3y = 6x - 6$$

A The lines coincide
* **B** The lines are parallel
C The lines are perpendicular
D The lines intersect, but are not perpendicular

* Students who answered this item correctly = 40%

- 16** Alex is building a ramp for a bike competition. He has two rectangular boards. One board is 6 meters long and the other is 5 meters long. If the ramp has to form a right triangle, what should its height be?



A 3 meters
B 4 meters
* **C** 3.3 meters
D 7.8 meters

* Students who answered this item correctly = 39%

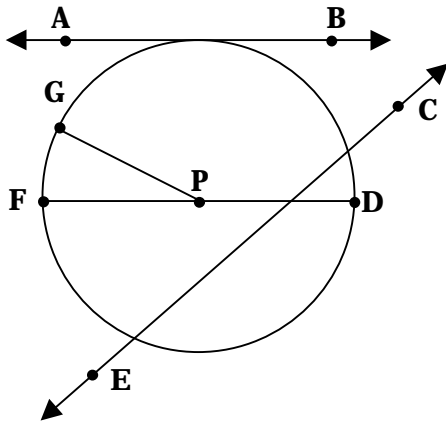
- 17** The length of a box is 100 inches, the width is 12 inches, and the height is 10 inches. What is the volume of the box?

A 122 cubic inches
B 1000 cubic inches
C 1200 cubic inches
* **D** 12,000 cubic inches

* Students who answered this item correctly = 61%

Directions: Do Numbers 18 through 23.

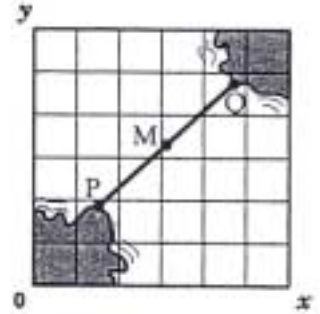
18 Which of the following is a secant of circle P?



- A \overline{AB}
 * B \overline{CE}
 C \overline{GP}
 D \overline{FD}

* Students who answered this item correctly = 30%

19 The graph below shows a bridge between two islands. If point M is the midpoint of \overline{PQ} , and $\overline{PM} = 6$ centimeters, what is the length of \overline{PQ} ?



- A 3 centimeters
 B 6 centimeters
 C 9 centimeters
 * D 12 centimeters

* Students who answered this item correctly = 66%

20 Consider the following algorithm:

Step 1 Write the prime factorizations of 16, 24, and 68 using exponents.

$$16 = 2^4$$

$$24 = 2^3 \cdot 3$$

$$68 = 2^2 \cdot 17$$

Step 2 Identify the largest exponent for each common factor of the prime factorizations

$$2^4$$

Step 3 Multiply the factors, each raised to its respective largest exponent.

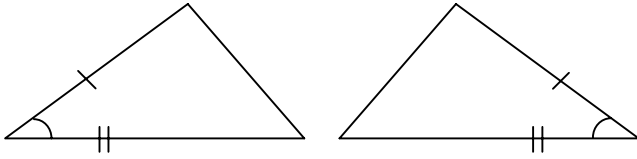
$$2^4 \cdot 3 \cdot 17$$

What is the algorithm above used for?

- A to find the prime factorizations of 16, 24, and 68
 B to find the greatest factor of 16, 24, and 68
 C to find the least common factor of 16, 24, and 68
 * D to find the least common multiple of 16, 24, and 68

* Students who answered this item correctly = 22%

- 21 Which theorem can be used to prove that the triangles in the figure below are congruent?



- A side-by-side (SSS)
- * **B** side-angle-side (SAS)
- C angle-side-angle (ASA)
- D angle-angle-side (AAS)

* Students who answered this item correctly = 63%

- 22 Which statement is true about the graphs of these equations?

$$y = 2x + 7$$

$$5y = 10x - 15$$

- A The lines coincide
- * **B** The lines are parallel
- C The lines are perpendicular
- D The lines intersect, but are not perpendicular

* Students who answered this item correctly = 37%

- 23 Aaron used the Pythagorean theorem to find the height of a tree. He calculated that the tree was $\sqrt{625}$ feet tall. Which of the following should be used to write the height of the tree?

- A ± 25 feet
- * **B** 25 feet
- C -25 feet
- D 25^2 feet

* Students who answered this item correctly = 44%

Directions: Do Number 24 in the Answer Booklet

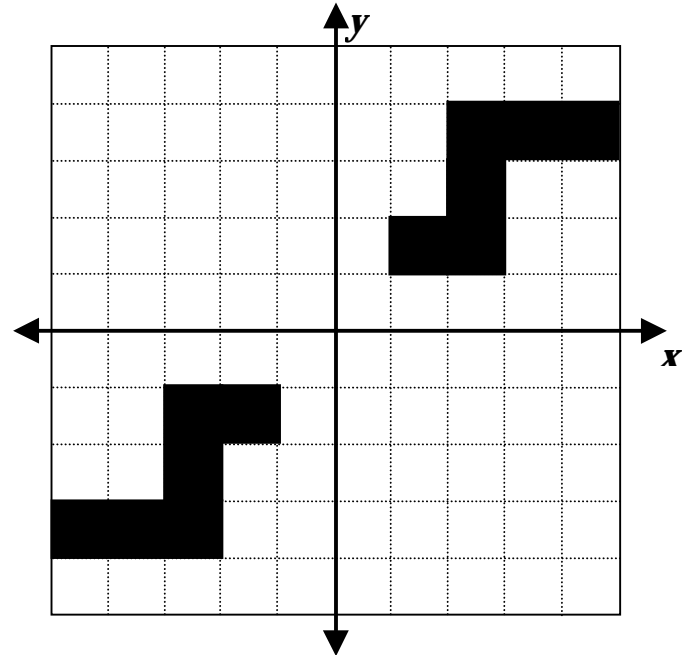
- 24 Sketch a cone.

* Students who earned 2 points = 48%;
 Students who earned 1 point = 10%
 Students who earned 0 points = 5%
 Students who left this item blank = 37%

(The answer to this item is in the Short Answer Problems section of the Answer Key – page 22.)

Directions: Do Numbers 25 - 31.

- 25 Which type of transformation is represented by the figures in the graph?



- A reflection and translation
- B reflection
- * **C** rotation
- D dilation and rotation

Students who answered this item correctly = 29%

26 Which of the following transformations produces a figure similar but not congruent to the original one?

- A A transformation that adds $\frac{1}{2}$ to the x -coordinate and subtracts $\frac{1}{2}$ from the y -coordinate of the vertices of a triangle
- B A transformation that adds 2 to the x -coordinate and multiplies by 2 the y -coordinate of the vertices of a triangle
- * C A transformation that multiplies by 2 the x and y coordinates of the vertices of a triangle
- D A transformation that adds 2 to the x -coordinate and divides by 2 the y -coordinate of the vertices of a triangle.

Students who answered this item correctly = 39%

27 If three cubes with sides numbered from 1 through 6 are tossed, what is the probability that either all the cubes land on 3 or that all the cubes land on 4?

- A $\frac{1}{6^3}$
- * B $\frac{2}{6^3}$
- C $\frac{3}{6^3}$
- D $\frac{4}{6^3}$

Students who answered this item correctly = 37%

28 Which of the following procedures for solving $2x^2 + 3x - 5 = 0$ is valid?

* A $2x^2 = -3x + 5$
 $2x^2 + 3x - 5 = -3x + 5 + 3x - 5$
 $2x^2 + 3x - 5 = 0$

$$x = \frac{-3 \pm \sqrt{(3)^2 - 4(2)(-5)}}{2(2)}$$

B $2x^2 = -3x + 5$
 $2x^2 + 3x - 5 = -3x + 5 + 3x - 5$
 $2x^2 + 3x - 5 = 0$

$$x = \frac{-2 \pm \sqrt{(2)^2 - 4(3)(-5)}}{2(3)}$$

C $2x^2 = -3x + 5$
 $2x^2 + 3x - 5 = -3x + 5 + 3x - 5$
 $2x^2 + 3x - 5 = 0$

$$x = \frac{-3 \pm \sqrt{(2)^2 - 4(3)(-5)}}{2(3)}$$

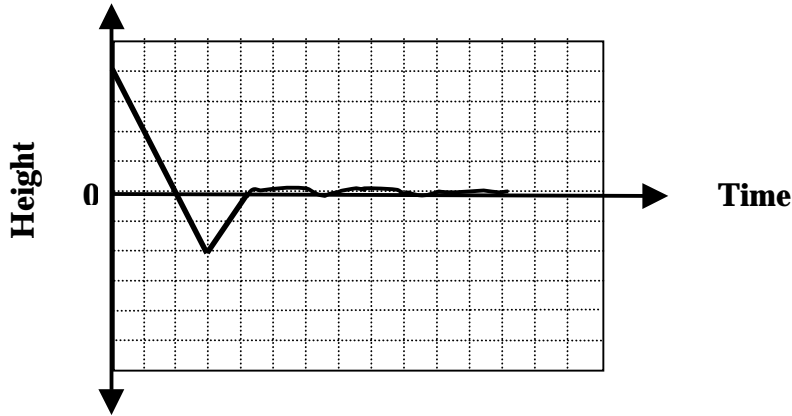
D $2x^2 = -3x + 5$
 $2x^2 + 3x - 5 = -3x + 5 + 3x - 5$
 $2x^2 + 3x - 5 = 0$

$$x = \frac{-2 \pm \sqrt{(3)^2 - 4(2)(-5)}}{4(2)}$$

Students who answered this item correctly = 35%

NOTE: Students are not asked to solve this quadratic equation. The quadratic equation is given on the Reference Sheet that appears in every form of AIMS-Mathematics. The p.o. that is being assessed here is "6.5.2 - Determining whether a given procedure for solving an equation is valid." Students simply need to match up the equation from the Reference Sheet with the correct procedure.

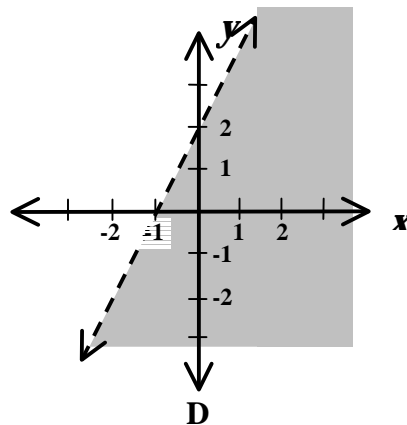
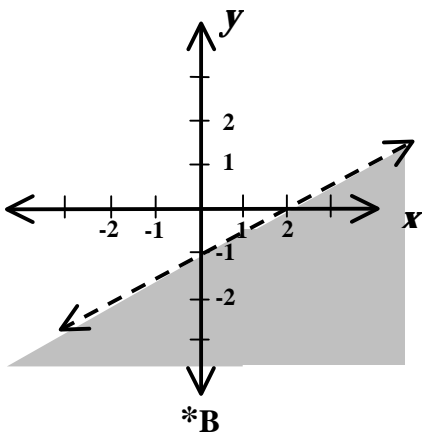
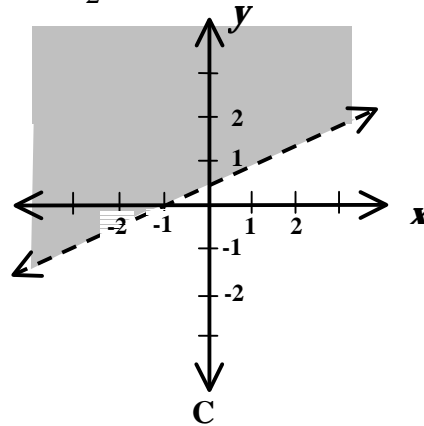
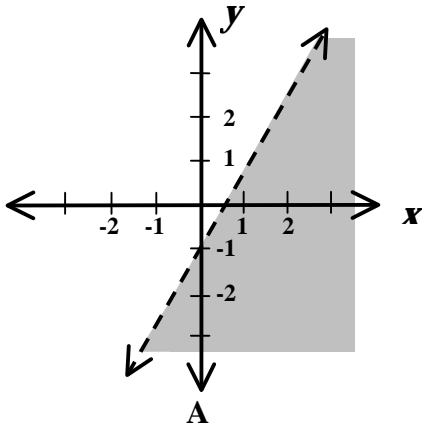
- 29 The graph depicts a real-world situation. Which of the following situations could it depict?



- * A A person dove into the water
 B A person jumped from a tree to the grass below
 C A plane landed safely
 D A plane crashed into the runway

Students who answered this item correctly = 74%

- 30 Which of these graphs correctly represents the inequality $y < \frac{1}{2}x - 1$?



Students who answered this item correctly = 46%

- 31** Solve $3x + 7 = 2x$. Show the steps you took to determine the solution.

(The answer to this item is in the Short Answer Problems section of the Answer Key – page 22.)

Students who earned 2 points = 30%
 Students who earned 1 point = 8%
 Students who earned 0 points = 24%
 Students who left this answer blank = 38%

Directions: Do Number 32 in the Answer Booklet

- 32** In a circus, a tightrope is stretched from the top of a 10-foot pole to the top of a 25-foot pole. The poles are 36 feet apart and perfectly vertical. How long is the tightrope?

Show the steps you took to determine the solution.

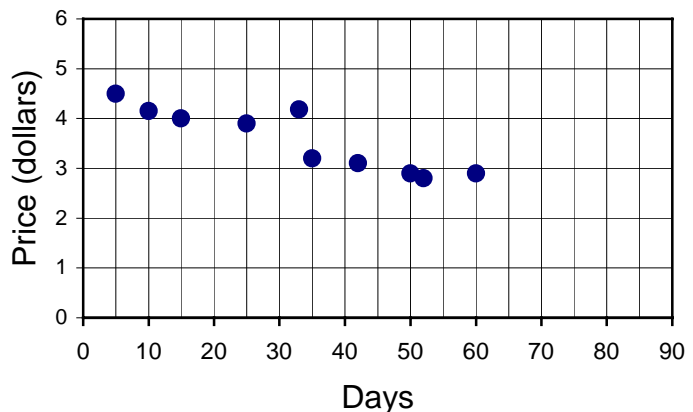
(The answer to this item is in the Short Answer Problems section of the Answer Key – page 22.)

* Students who earned 2 points = 10%;
 Students who earned 1 point = 7%;
 Students who earned 0 points = 41%
 Students who left this answer blank = 42%

Directions: Do Number 33.

- 33** This graph shows some days' costs for natural gas used in a household over the last two months. If the pattern continues, about how much will the household spend on natural gas during the coming month?

- A \$50
- * B \$60
- C \$70
- D \$80



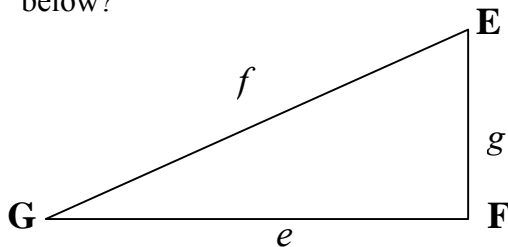
Students who answered this item correctly = 23%

Core No Longer Tested on AIMS Items

The following items were on AIMS-Mathematics Form A, but will no longer be used on future forms as they are measuring p.o.'s that are in the "Core but not tested" category (i.e., p.o.'s that are Core-T). See the AIMS High School Blueprint Chart on the web at <http://www.ade.az.gov/standards/AIMS/blueprints/>

Directions: Do Numbers 34 - 37.

- 34** What is the tangent of $\angle G$ in the triangle below?

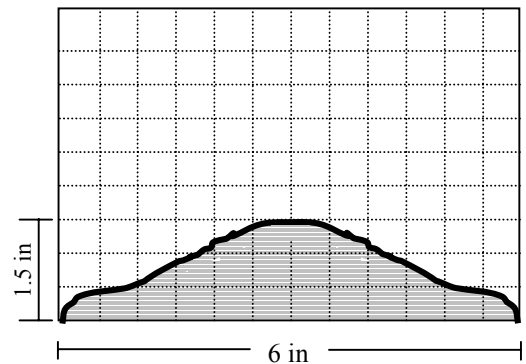


- * **A** $\frac{g}{e}$
B $\frac{e}{g}$
C $\frac{g}{f}$
D $\frac{e}{f}$

NOTE: The formulas for all the trigonometric functions are in the Reference Section.

Students who answered this item correctly = 41%

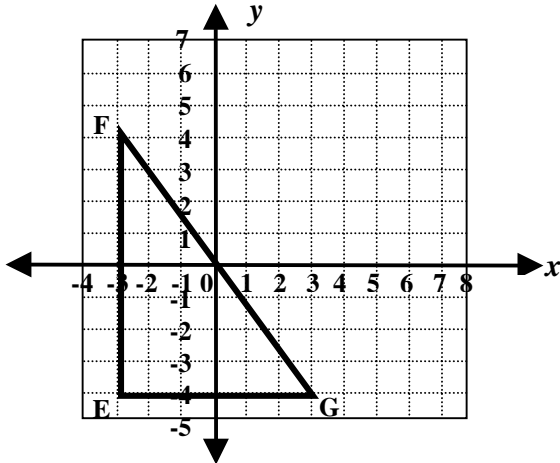
- 35** A carpenter sketched to scale the pattern for the decorative top for a new entertainment center. If the entertainment center is to be 72 inches wide, by what factor must he multiply all his measurements?



- A** 4
* **B** 12
C 24
D 48

Students who answered this item correctly = 59%

- 36** Triangle LMN and triangle EFG are similar triangles. Triangle EFG is shown on the grid below. If the coordinates of point L are (4, 3) and the coordinates of point M are (4, 7), what are the coordinates of point N?



- A (8, 3)
 B (4, 6)
 * C (7, 3)
 D (7, 2)

Students who answered this item correctly = 48%

- 37** Which of these conditional statements has a converse that is true?
- A If it is raining, then there are clouds.
 B If a quadrilateral is a square, then it has four equal sides.
 C If it is not daytime, then you cannot see the sun.
 * D If a polygon has congruent angles, then it is regular.

Students who answered this item correctly = 21%

- 38** The table below shows the distance five students live from school. Which of the following conclusions can be drawn from the information?

Students	Distance in Miles
1	1.9
2	0.5
3	1.1
4	0.4
5	1.7

- * A All the students live less than 2.0 miles from school
 B All the students live less than 0.5 miles from school
 C All the students live more than 2.0 miles from school
 D All the students live between 1.0 and 2.0 miles from school.

Students who answered this item correctly = 72%

Non-Core Items

The following items were on AIMS-Mathematics Form A but will no longer be used on future forms as they are not in the AIMS-Mathematics Core (i.e., p.o.'s that are L). See the AIMS High School Blueprint Chart on the web at <http://www.ade.az.gov/standards/AIMS/blueprints/>

Directions: Do Numbers 39 - 44.

- 39** A 2-member committee will be selected from the 6 members of the high school student council to attend a rally in Washington, D.C. How many different 2-member committees are possible?

A 12
 * **B** 15
 C 30
 D 90

Students who answered this item correctly = 30%

- 40** Simplify: $\begin{bmatrix} 2 & 4 \\ 1 & 5 \\ 3 & 6 \end{bmatrix} - \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ 1 & 2 \end{bmatrix}$

A $\begin{bmatrix} 1 & 4 \\ 1 & 5 \\ 2 & 6 \end{bmatrix}$
 B $\begin{bmatrix} 1 & 2 \\ 1 & 5 \\ 3 & 6 \end{bmatrix}$
 * **C** $\begin{bmatrix} 1 & 2 \\ 1 & 3 \\ 2 & 4 \end{bmatrix}$
 D $\begin{bmatrix} 2 & 2 \\ 1 & 3 \\ 3 & 4 \end{bmatrix}$

Students who answered this item correctly = 76%

- 41** The number, N , of bacteria in a test tube as a function of time, t , is given by the equation $N = ke^{rt}$, where k is the initial population of bacteria, e is a numerical constant, and r is the rate of growth. Which of these is the independent variable?

A N
 B k
 C e
 * **D** t

Students who answered this item correctly = 18%

- 42** Solve: $\frac{x}{x+6} = \frac{x}{5}$

A $x = 0; x = 11$
 * **B** $x = 0, x = -1$
 C $x = 1$
 D $x = -1$

* Students who answered this item correctly = 27%

43 The following list shows the road distances between some cities in the U.S.

- The distance between Denver and Phoenix is 810 miles
- The distance between Phoenix and Miami is 2350 miles
- The distance between Miami and Denver is 2110 miles
- The distance between Denver and Houston is 1030 miles
- The distance between Houston and Phoenix is 1160 miles
- The distance between Miami and Houston is 1190 miles

Which of the following matrices correctly shows the information in the list?

A

	D	H	M	P
D	0	1030	2110	810
H	1030	0	1190	2350
M	2110	1190	0	1160
P	810	2350	1160	0

C

	D	H	M	P
D	0	1030	2350	810
H	1030	0	1190	1160
M	2110	1190	0	2350
P	810	2110	1160	0

***B**

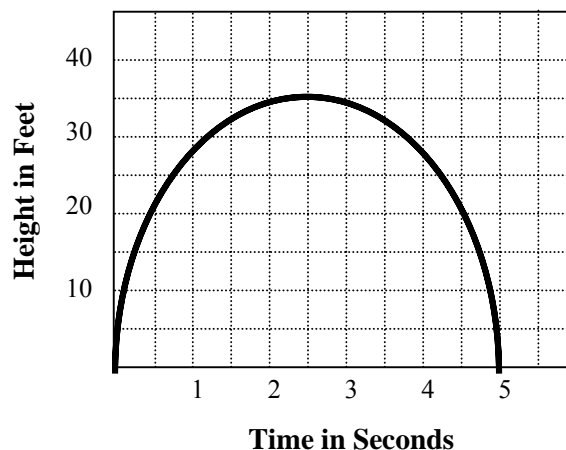
	D	H	M	P
D	0	1030	2110	810
H	1030	0	1190	1160
M	2110	1190	0	2350
P	810	1160	2350	0

D

	D	H	M	P
D	0	1190	2110	810
H	1030	0	1030	1160
M	2110	1190	0	2350
P	810	1160	2350	0

Students who answered this item correctly = 65%

44 The figure shows the height, h , of a thrown ball as a function of time. Height is measured in feet and time is measured in seconds. How long will it take for the ball to return to the ground?

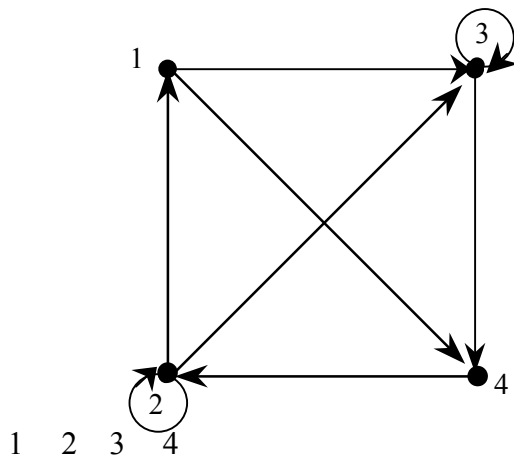


NOTE: This item measures p.o. 3.9.3 – determine the max/min points from a graph. However, the Math Task Force determined that this should not be tested at the H.S. level as it is first introduced at the 8th Grade level. It is coded “U” on the Math Blueprint Chart.

- A** 2.5 seconds
- B** 3.5 seconds
- * C** 5.0 seconds
- D** 35.0 seconds

Students who answered this item correctly = 57%

45 What is the matrix representation of the directed graph shown below?



A

$$\begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

1 2 3 4

B

$$\begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}$$

C

$$\begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

1 2 3 4

*** D**

$$\begin{matrix} 1 \\ 2 \\ 3 \\ 4 \end{matrix} \begin{bmatrix} 0 & 0 & 1 & 1 \\ 1 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 \end{bmatrix}$$

Students who answered this item correctly = 18%

Directions: Do Number 46 in the Answer Booklet

- 46** The table below shows the 100-meter-dash times for Rob in the last 7 races.

Race Number	Time
1	10.23 sec.
2	10.21 sec.
3	10.20 sec.
4	10.12 sec.
5	10.23 sec.
6	10.18 sec.
7	10.20 sec.

Draw a scatterplot that correctly shows the information in the table. You must label your graph.

(The answer to this item is in the Short Answer Problems section of the Answer Key.)

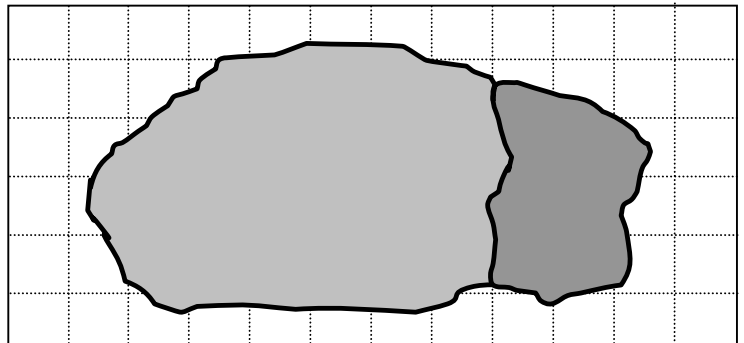
- * Students who earned 2 points = 15%;
 Students who earned 1 point = 19%;
 Students who earned 0 points = 26%
 Students who left this item blank = 40%

- 47** A high school ecology class sampled fish in a lake to determine the relative populations of different species of fish. The results of the count are shown in the table, and the part of the lake that was sampled is shown as the darker region in the diagram below.

Fish Species	Count
Species A	147
Species B	120
Species C	90
Species D	11
Species E	52

If the lake has an even depth and the fish are randomly distributed, which of these is the best estimate for the number of Species C fish in the lake?

- A 250
 B 320
 * C 450
 D 600



Students who answered this item correctly = 30%

48 The following activities are performed when completing an oil change.

A_1 removing the oil plug and draining the oil (5 minutes)

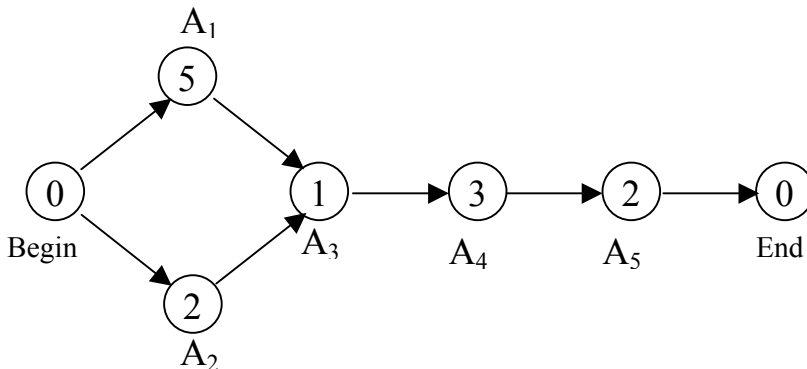
A_2 removing the oil filter (2 minutes)

A_3 replacing the oil plug (1 minute)

A_4 installing the new filter (3 minutes)

A_5 refilling the engine with oil (2 minutes)

The directed graph (digraph) below is an activity-directed finite graph of the oil change. How much time is required to complete the job?



A 6 minutes

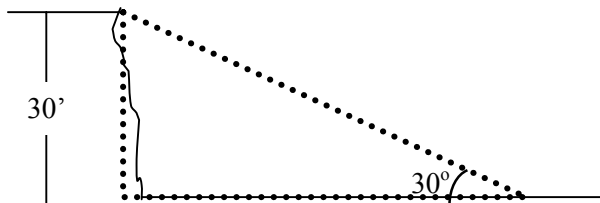
B 8 minutes

* **C** 11 minutes

D 13 minutes

Students who answered this item correctly = 16%

49 A landscaper fills a 30-foot drop-off so it will have a 30° slope, as shown in the drawing below.



What will the approximate length of the sloped surface be when the job is completed?

A 15 feet

B 35 feet

C 52 feet

* **D** 60 feet

Students who answered this item correctly = 45%

Directions: Do Number 50 in the Answer Booklet

- 50** A professional team always drafts players from two different colleges. The coaching staff makes its decision about who to draft based on the performance of the most recently drafted player.
- If the last player drafted was from College 1, there is a 50% probability that the next player will be drafted from College 2.
 - If the last player drafted was from College 2, there is an 80% probability that the next player will be drafted from College 1.

Create a matrix that shows these probabilities.

- * **Students who earned 2 points = 1%**
Students who earned 1 point = 2%
Students who earned 0 points = 37%
Students who left this item blank = 60%

(The answer to this item is in the Short Answer Problems section of the Answer Key.)

Directions: Do Number 51

- 51** Which of the following pairs of events are dependent events?
- A** A coin is tossed 2 times. Event A is that the coin lands heads facing up on the first toss. Event B is that the coin lands heads facing up the second time.
 - B** A marble is randomly selected out of a bag containing red, green, and blue marbles. Event A is selecting a blue marble first. Event B is selecting a blue marble on the second try after the first marble is returned to the bag.
 - C** A thumbtack falls on the floor. Event A is that the tack lands with the point facing up. Event B is that if the tack falls again, it lands with the point facing down.
 - * **D** Event A is that a red candy is randomly selected from a bag of different-colored candies. Event B is that the second candy randomly selected is also red.

Students who answered this item correctly = 17%

AIMS Mathematics Released Items – Form A – Answer Key

Answer Key Core Items

NOTE: The notation “SA” in the Key column indicates that this is a short answer item. Please see page 22 for the scoring guide and sample answers.

Release Item #	Key	Form A Item #	Standard *	Description	Percent of Students who Answered Correctly
23	B	77	10206	Choose appropriate number form	44%
5	C	14	10208	Convert standard notation to scientific notation	45%
33	B	52	20302	Make predictions from pattern in data	23%
29	A	44	30102	Describe situation given graph	74%
6	C	17	30401	Graph a linear equation in two variables	46%
30	B	26	30402	Graph a linear inequality in two variables	46%
4	C	13	30403	Determine slope and intercepts of linear equation	44%
13	A	40	30404	Determine equation of line through 2 points	36%
7	D	19	30603	Simplify algebraic exp. using distributive property	49%
10	C	32	30604	Simplify square/cube roots – perfect square/cube	45%
1	B	2	30606	Evaluate numerical and absolute value expressions	46%
8	D	21	30607	Multiply/divide monomials	44%
9	D	23	30609	Solve linear equations, inequalities in 1 variable	50%
31	SA	18	30609	Solve linear equations, inequalities in 1 variable	8%/30%
12	C	34	30610	Solve formulas for specified variables	50%
3	A	11	30801	Translate and generate math expressions	79%
24	SA	81	40101	Sketch geometric figures	10%/48%
17	D	53	40201	Calculate area, volume	61%
16	C	49	40203	Solve problems using Pythagorean theorem	39%
32	SA	54	40203	Solve problems using Pythagorean theorem	7%/10%
19	D	58	40206	Calculate midpoint, distance between points	66%
18	B	57	40402	Identify circle parts	30%
21	B	70	40403	State valid conclusions using postulates, theorems	63%
15	B	47	40501	Compare geometric lines given algebraic equations	40%
22	B	71	40501	Compare geometric lines given algebraic equations	37%
26	C	85	40601	Classify transformations–congruent/non-congruent	39%
25	C	86	40602	Determine characteristics of transformations	29%
20	D	69	50302	Determine the purpose of algorithm	22%
2	A	8	50303	Determine if algorithms are equivalent	27%
14	C	43	50401	Find outcome set of a situation	51%
27	B	82	50402	Event likeliness	37%
11	D	30	60203	Distinguish valid/invalid arguments	38%
28	A	33	60502	Equation solving: valid procedures	35%

Continued on next page

AIMS Mathematics Released Items – Form A – Answer Key

Answer Key Core No Longer Tested on AIMS Items

NOTE: The notation “SA” in the Key column indicates that this is a short answer item. Please see next page for the rubric and sample answers.

Release Item #	Key	Form A Item #	Standard *	Description	Percent of Students who Answered Correctly
34	A	31	30501	Trigonometric functions	41%
35	B	66	40603	Transformational principles	59%
36	C	87	40502	Characteristics of figures	48%
37	D	65	60201	Statement converse	21%
38	A	41	20103	Draw inferences from data	72%

Answer Key Non-Core Items

NOTE: The notation “SA” in the Key column indicates that this is a short answer item. Please see next page for the rubric and sample answers.

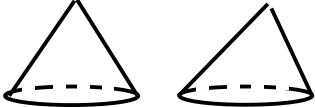
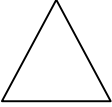
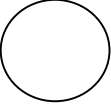

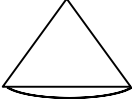
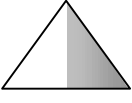
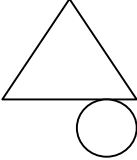
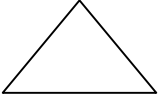
Release Item #	Key	Form A Item #	Standard *	Description	Percent of Students who Answered Correctly
39	B	3	20804	Combinations and permutations	30%
40	C	29	30608	Add/subtract/multiply matrices	76%
41	D	16	30101	Identify independent/dependent variables	18%
42	B	7	30613	Solve proportions, linear equations	27%
43	B	73	50101	Matrices, finite graphs	65%
44	C	22	30903	Maximum/minimum points from graph	57%
45	D	37	50203	Convert finite graph into matrix	18%
46	SA	27	20503	Create graphs	15%/19%
47	C	24	20602	Estimate probabilities	30%
48	C	59	50201	Interpret matrices, finite graphs	16%
49	D	39	30502	Trigonometric functions in triangles	45%
50	SA	45	50101	Matrices, finite graphs	1%/2%
51	D	83	20603	Independent/dependent events	17%

*This code references the Arizona Academic Standards document which can be found on our web site, www.ade.az.gov/standards. The referenced standard number represents the standard, the concept and the performance objective.

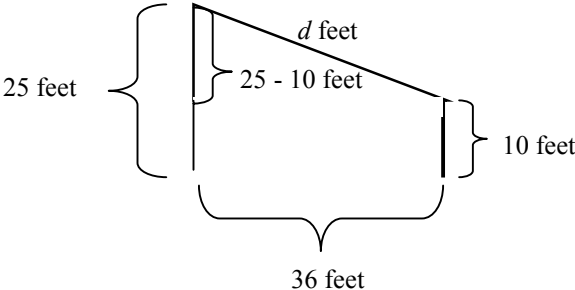
Example, 30903 represents Standard 3 (3), Concept 9 (09), and performance objective 3 (03).

Answer Key
Short Answer Problems

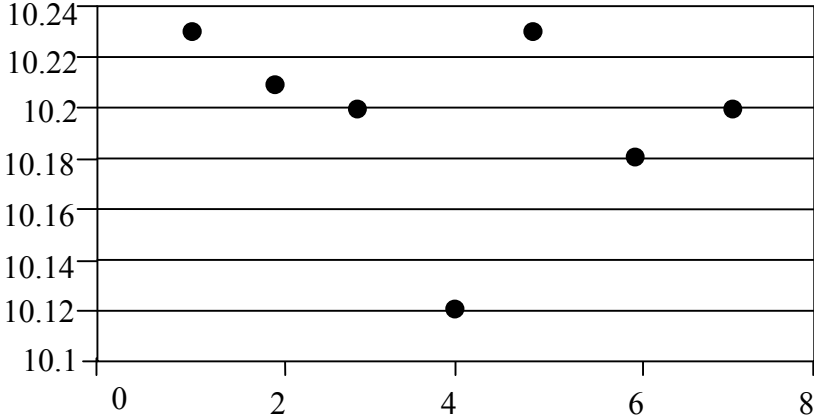
NOTE: Short answer items will not be on AIMS-Mathematics on future forms. The test will be 100% multiple choice.

Release Item #	Short Answer Scoring Guide – Core Items
24	<p>2 Points – for a correct drawing of a cone (i.e., includes dotted lines to indicate unseen portion or other correctly labeled views of a cone)</p> <div style="text-align: center;">  </div> <p>OR drawing at least 2 labeled views so that a cone can be uniquely determined</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  SIDE VIEW </div> <div style="text-align: center;">  BOTTOM VIEW </div> </div> <p>NOTE: Any solid cone is also acceptable for 2 points</p> <div style="text-align: center;">  </div> <p>1 Point - Any ONE of the following:</p> <ul style="list-style-type: none"> drawing anything that resembles a cone <div style="display: flex; align-items: center; justify-content: center;">   <div style="margin-left: 10px;">Triangle WITH shading</div> </div> <ul style="list-style-type: none"> drawing a net of a cone <div style="text-align: center;">  </div> <p>0 Points – Other Responses</p> <div style="display: flex; align-items: center; justify-content: center;">  <div style="margin-left: 10px;">Triangle WITHOUT shading</div> </div>

AIMS Mathematics Released Items – Form A – Answer Key

Release Item #	Short Answer Scoring Guide – Core Items
31	<p>Solve $3x + 7 = 2x$. Show the steps you took to determine the solution.</p> <p>2 Points - Correct Process AND Correct Answer, $x = -7$</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: left;"> <p><u>Example 1:</u></p> $3x + 7 = 2x$ $x + 7 = 0$ $x = -7$ </div> <div style="text-align: left;"> <p><u>Example 2:</u></p> $3x + 7 = 2x$ $7 = -x$ $-7 = x$ </div> <div style="text-align: left;"> <p><u>Example 3:</u></p> $3x + 7 = 2x$ $x = -7$ </div> </div> <p><u>Example 4:</u> Shows that $x = -7$ is a correct solution to the equation $3x + 7 = 2x$ by using guess and check.</p> <p>1 Point - Any ONE of the following:</p> <ul style="list-style-type: none"> Solving for x with ONE error Correct process to $-x = 7$ -7 alone (no work shown) <p>0 Points - Other responses</p>
32	<p>In a circus, a tightrope is stretched from the top of a 10-foot pole to the top of a 25-foot pole. The poles are 36 feet apart and perfectly vertical. How long is the tightrope? Show the steps you took to determine the solution.</p> <p>2 Points - Correct Process AND Correct Answer, 39 feet (Diagram not required)</p> <p><u>Example 1:</u></p> $25 - 10 = 15$ $15^2 + 36^2 = d^2$ $225 + 1296 = d^2$ $1521 = d^2$ $\sqrt{1521} = d$ $39 = d$ <p>NOTE: $3\sqrt{169}$ is OK</p> <div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>1 Point - Any ONE of the following:</p> <ul style="list-style-type: none"> correct process to $15^2 + 36^2 = d^2$ or $d = \sqrt{15^2 + 36^2}$ correct process with one computation error correct process using 25 and 36; must round correctly <p>0 Points – Other Responses</p> </div> <div style="flex: 1; text-align: center;">  </div> </div>

AIMS Mathematics Released Items – Form A – Answer Key

Release Item #	Short Answer Scoring Guide – Non-Core Items
46	<p>2 Points – for correctly plotting 7 points on scatterplot with consistent scales and axes correctly labeled (axes can be switched)</p>  <p>1 Point – for any ONE of the following:</p> <ul style="list-style-type: none"> correctly plotting at least 5 points on a scatterplot with consistent scales and axes correctly labeled correctly plotting 7 points on a graph (other than a scatterplot) with consistent scales and correct labels correctly plotting 7 points with inconsistent scales OR incorrect or missing labels <p>0 Points – Other responses</p>
50	<p>2 Points – for correctly labeled matrix (or rectangular array) with correct entries (may use decimals/fractions/percents to express probabilities)</p> <p>Examples: $\begin{matrix} & C_1 & C_2 \\ C_1 & \begin{bmatrix} 50\% & 50\% \end{bmatrix} \\ C_2 & \begin{bmatrix} 80\% & 20\% \end{bmatrix} \end{matrix}$</p> <p>$\begin{matrix} & C_1 & C_2 \\ C_1 & \begin{bmatrix} .50 & .50 \end{bmatrix} \\ C_2 & \begin{bmatrix} .80 & .20 \end{bmatrix} \end{matrix}$</p> <p>$\begin{matrix} & C_1 & C_2 \\ C_1 & .50 & .50 \\ C_2 & .80 & .20 \end{matrix}$</p> <p>(and others)</p> <p>1 Point – for any ONE of the following:</p> <ul style="list-style-type: none"> a matrix with 3 of the 4 labels correct and correct entries a correctly labeled matrix and 2 or 3 correct entries a correctly labeled matrix whose entries are correct; however, the decimal or percent notation is missing <p>0 Points – Other responses</p>